The Economic Role of Wild and Free Roaming Horses and Burros on Rangelands in the Western United States

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Part 2

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The Economic Role of Wild and Free Roaming Horses and Burros on Rangelands in the Western United States

by

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Horses and Burros represent one of the major factors that helped in the settlement of the Western United States. As a result of this history, and popular novels such as Thunderhead and My Friend Flicka, horses have captured the atten-tion of people throughout the world.

Throughout most of the history of the United States man has been able to use and abuse these animals at their discretion. However, Velma Johnson (popularly known as Wild Horse Annie) was instrumental in the passage of two pieces of legislation (public laws 86-234 and 92-195) which significantly affected the management of horse and burro populations that use federally administered lands. Public law 86-234 restricted the use of motorized vehicles "... for the purpose of capturing or killing, any wild unbranded horse, mare, colt or burro running at large on the public land or ranges..." However, this restriction was judged to be inadequate to stop abuses and inhumane treatment of these animals. As a result, public law 92-195 was passed by congress, with essentially no opposition, on December 15, 1971. Some of the major provisions of this law included the following:

1) All "Wild and Free roaming horses and burros" (WFHB) that use public lands are to be administered by the Forest Service (FS) and Bureau of Land Management (BLM).
2) Excess numbers can be destroyed in a "humane" manner or "captured and removed for private maintenance under humane conditions and care".
3) No WFHB nor any part thereof can be sold for any consideration.
4) WFHB using privately owned lands can be removed by personnel of the responsible agency if requested by the private land

5) Private citizens may not do any of the following:

a. remove or attempt to remove WFHB from public lands.

b. convert WFHB to private use without authority.

c. maliciously cause the death or harrasement of any WFHB.

d. process or permit any WFHB to be processed into any commercial product.

e. sell any WFHB that are held under private maintenance.

6) No WFHB are to be relocated to areas where they did not exist when the law was passed in 1971.

The restrictions in this law lead to a number of interpretations and some subsequent changes in the law.

Perhaps the first question that was in need of resolution concerned the management of WFHB that use lands not administered by either the FS or BLM (e.g. Park Service, Defense Department and Bureau of Reclamation). Section 2 part e. of Public Law 92-195 states "public lands" means any lands administered by the Secretary of Interior through the Bureau of Land Management or by the Secretary of Agriculture through the Forest Service." The agencies involved have interpreted this portion of the law very strictly--i.e. only the BLM and Forest Service are governed by the WFHB population acts.[1/] However, (most WFHB populations use lands administered by several agencies (see page 7). If a herd of WFHB use FS or BLM lands during any portion of the year, it has generally been conceeded that they are subject to PL 92-195 and must be administered with the BLM or FS and the other administrator(s) involved. As a result, some land administrators have

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1/ The other agencies generally follow the same guidelines as those used by the BLM and FS however, because they realize that actions that are "too far" out of line could result in a change in the law that would also make them subject to WFHB acts.

tried to establish that herds either do or do not use BLM or FS lands in an effort to shift management responsibility to another agency.[2/]

Recently some of the restrictions found in PL 92-195 and 86-234 have been modified. For example, PL 94-579 which was passed on 21 Oct. 1976) provided that helicopters and other motor vehicles could be used to capture and transport WFHB provided: (a) a public hearing is held and (b) their use is under the direct supervision of BLM or FS employees. This change allowed agency personnel to accelerate roundups in areas where excess numbers of WFHB were judged to exist. Further changes were passed in PL 95-514 (1979) which provided that: (a) transfer of ownership of WFHB to private citizens may occur if WFHB have been held under private maintenance for one year (b) no more than four WFHB may generally be adopted by any one individual in any year and (c) a research program be established which would help to determine the number of WFHB to be managed for.

While the preceeding legislation has been felt, by some groups, to be too weak to provide protection for WFHB populations, their impact has probably been larger than some have suspected. The WFHB problem must however, be viewed from a historical perspective.

WFHB From a Historical Perspective[3/]

It is a generally accepted fact that horses and burros were introduced to Northern America sometime after the Spanish discovery of this continent. As such, horses and burros do not represent "native" species--a fact often used by persons which advocate their removal from public lands. There is also

2/ The Dugway Proving Grounds, for example, rounded up 95 and sold 90 head of horses in 1977 as "army surplus" property. The remaining animals in the area were judged to use neighboring BLM lands and therefore had to be administered by the BLM. Similar roundups have been conducted on lands administered by the Park Service, Fish and Wildlife Service and lands administered by other federal agencies.

little doubt that they played a major part in the settlement of the Western United States. This part as portrayed in numerous movies, books and folklore is generally considered to be the major reason why they "must be" maintainedi.e. advocates feel that WFHB are an integral part of the "American Heritage." There is also little doubt that their numbers has declined since the turn of the century. For example, it was estimated that there were about 150,000 horses using public lands in the early 30's (Zarn, Heller and Collins, 1977). McKnight (1958) also found that perhaps so many as 13,000 feral burros may have been using lands in the Western U.S. in 1957. No trend data is available over time but the data in figures 1 and 2 suggest that horses and burro numbers in the U.S. declined rapidly after the advent of tractors and World War II. It should also be noted that the number of horses and mules in the eleven western states declined at a relatively slow rate during this period.

While the number of horses and mules on farms has declined at a relatively even rate since the 1900's, the number of horses slaughtered[4/] has fluctuated widely over time as shown in Figure 3. Large numbers of horses were slaughtered during the decade 1946 to 1956 with smaller numbers being slaughtered in other times. Only recently have the numbers approached these early levels. The use of horsemeat has not been studied but the data in Figure 4 suggests that the U.S. has become a net exporter of horse-meat since 1972. It should be noted that while there is not perfect correspondence, the passage of PL 86-234 in 1959 probably resulted in a decline in the number of horses slaughtered. This act probably also caused the U.S. to

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4/ Readers should particularly note that the data in Figures 3 and 4 relate only to horses that were inspected. This generally included only those animals that may be used for human consumption. As a result, numerous but unknown numbers of animals may have been slaughtered for other purposes.

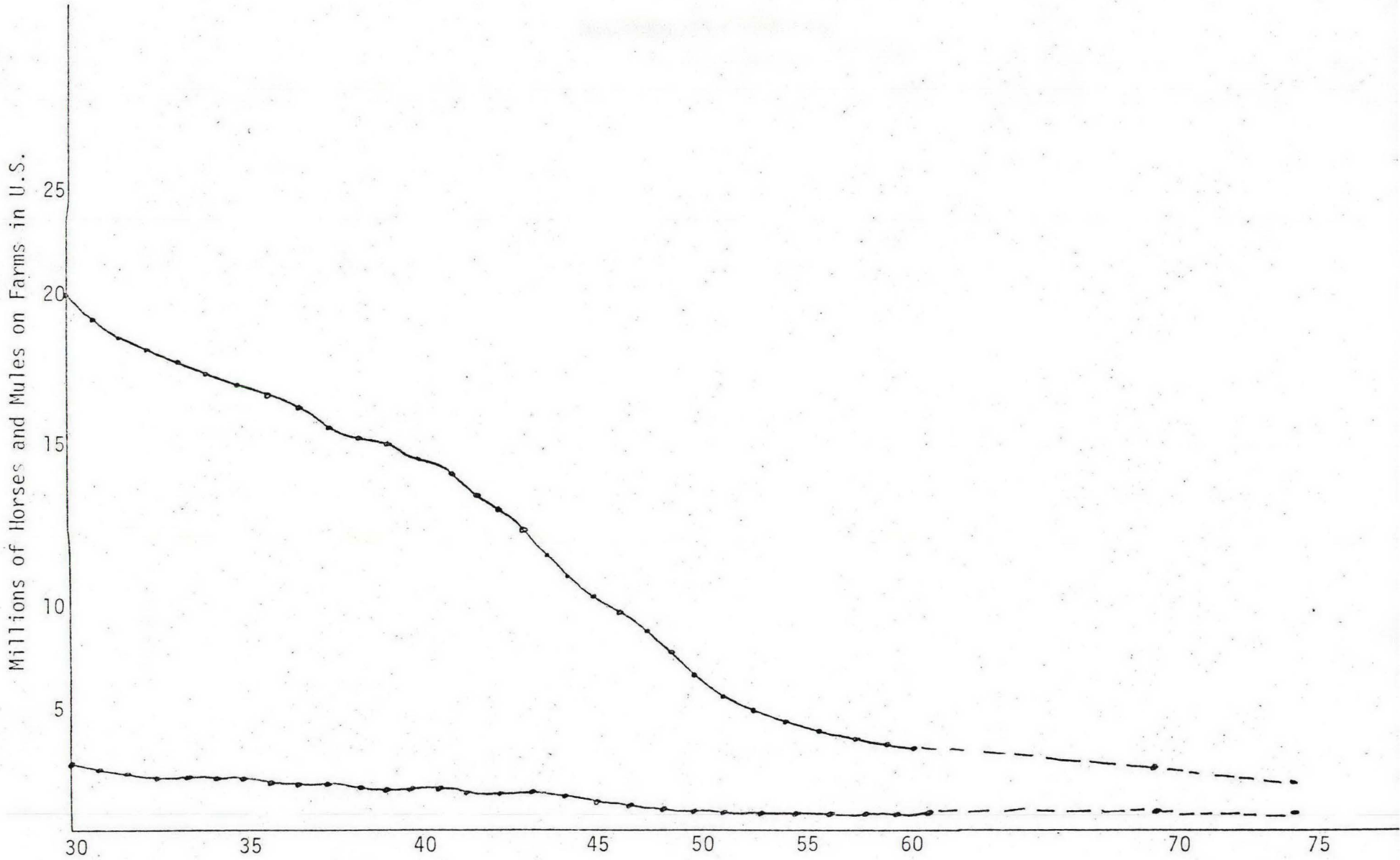

Figure 1 Millions of Horses and Mules on Farms in U.S. and the West, 1930-1974

Source: Agricultural Statistics

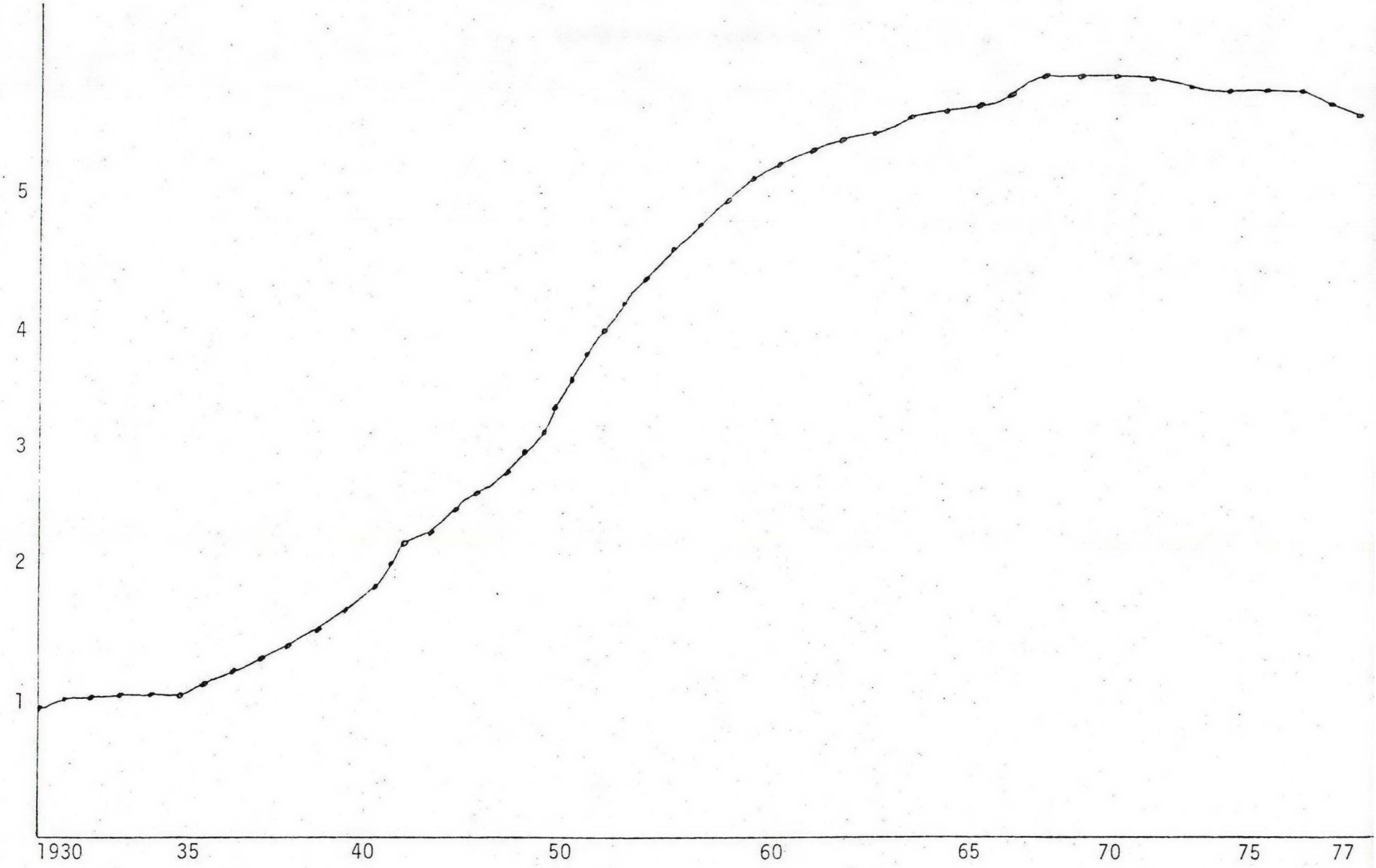

Figure 2. Millions of Tractors of Farms, 1930-77

Source: Agricultural Statistics

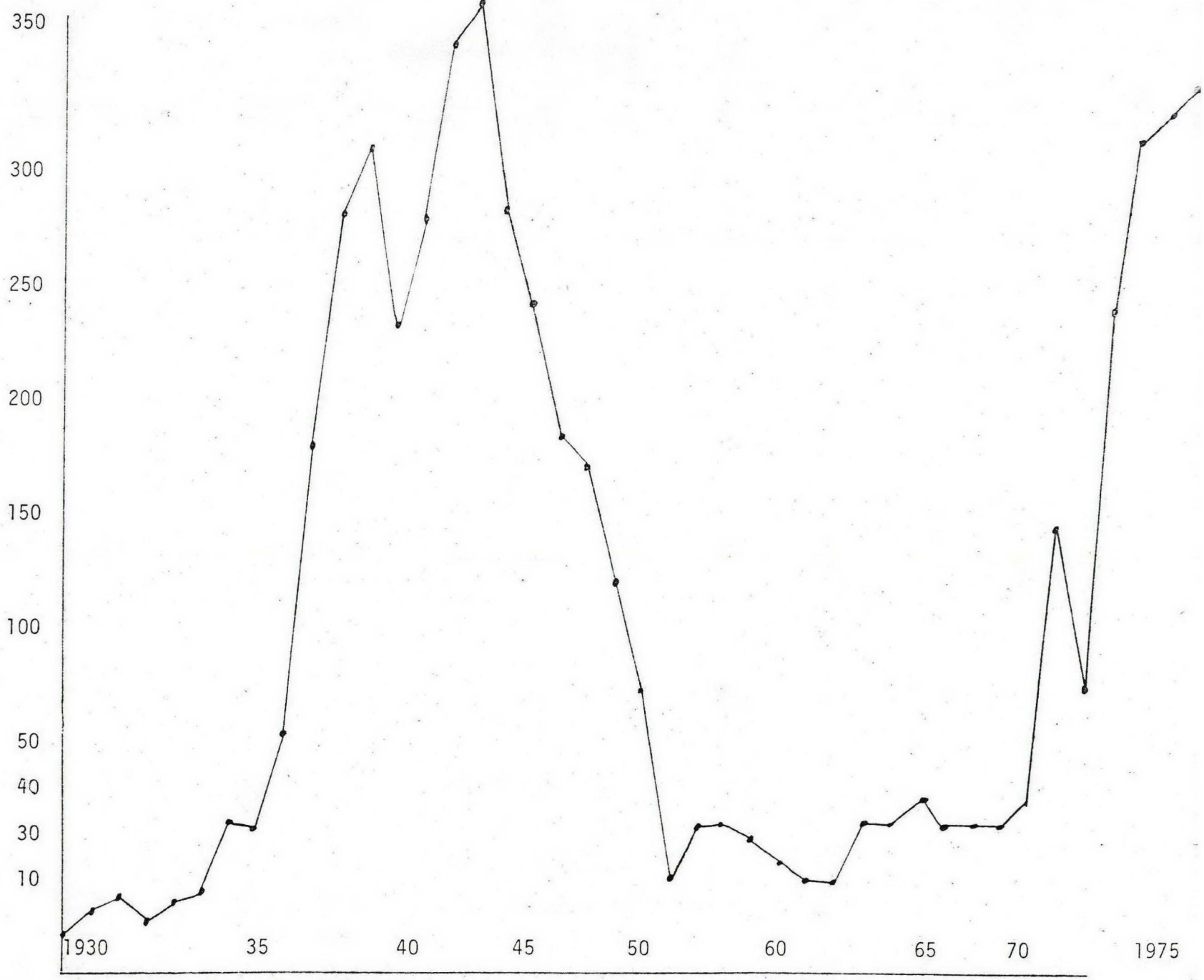

Figure 3. Thousands of Horses slaughtered under Federal Inspection 1937-1978
Source: Agricultural Statistics

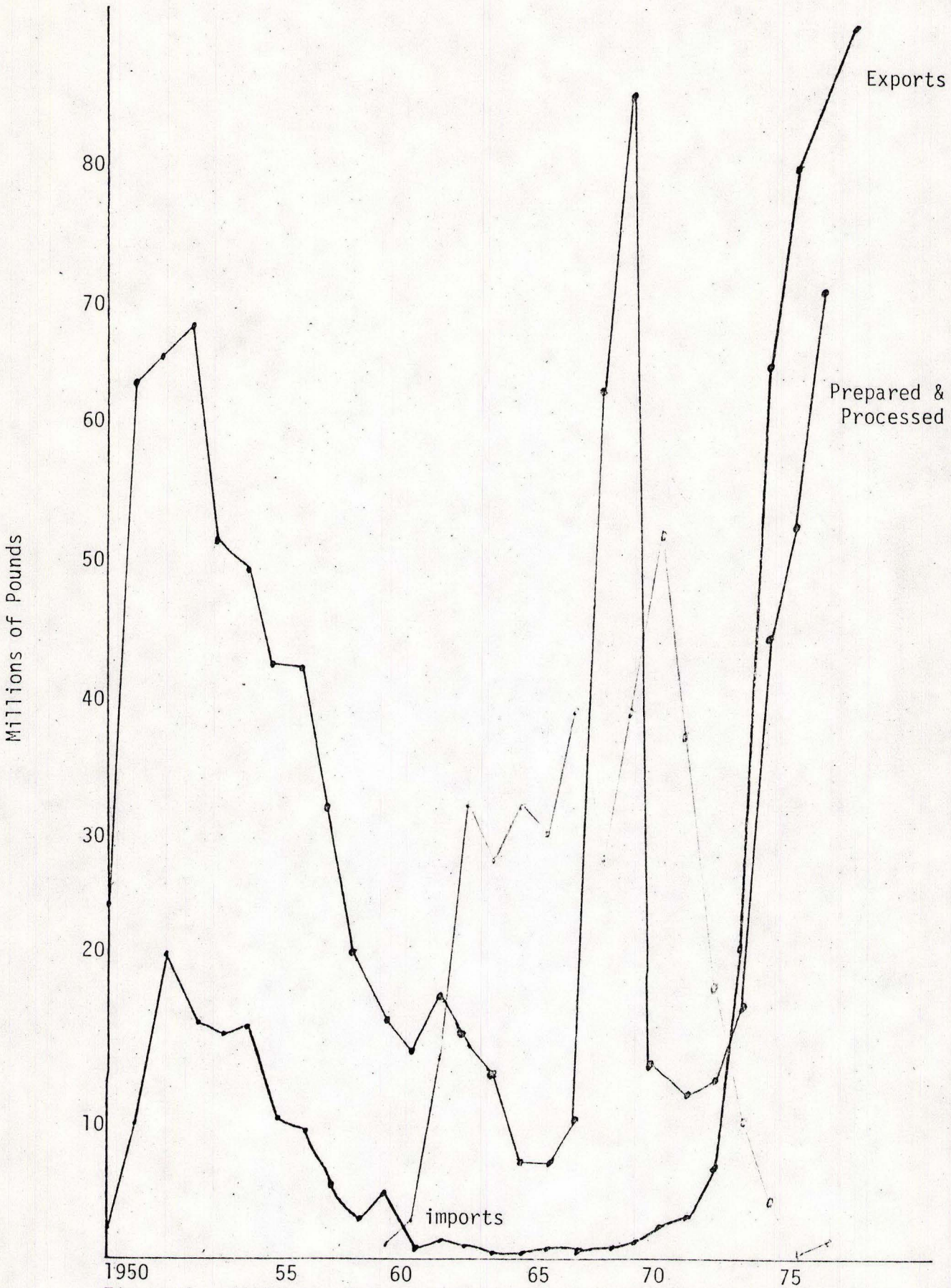

Figure 4. Millions of inspected pounds of horsemeat prepared and processed passed for entry and exported in the U.S., 1950-1976.

become a net importer of horse-meat during the 1962-1972 period. While it is not possible to identify what portion of the animals slaughtered before 1971 were WFHB, the data does suggest that WFHB numbers may have increased after 1959. Historic population data is not available for this period, so any response of WFHB populations to changes in the law would be pure supposition. The data available[5/] (see also the BLM and FS reports to Congress) suggests that WFHB populations have increased dramatically since 1970-71. As a result, the BLM and FS have conducted roundups in an effort to reduce the populations of WFHB using public lands. These roundups and the associated management of WFHB populations have caused numerous problems. In an effort to gain a perspective of these problems and their associated economic implications, a questionnaire (see appendix B) was sent to every BLM district in the west and each forest that had more than ten Wild and Free Roaming Horses or Burros. Nearly[6/] every forest and district responded. The data in the questionnaires and published reports provide the primary basis for this study.

Problems Faced by BLM and Forest Service Administrators

While many problems must be considered by BLM and Forest Service administrators when WFHB populations are involved, these problems can be viewed in a time sequence

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5/ Any population estimates that are available can be questioned as counting procedures are subject to error. Furthermore, most of the early estimates were primarily educated guesses. As a result of this error, most people who oppose WFHB roundups question the population estimates used by agency personnel.

6/ Only the Susanville and Boise districts of the BLM have not returned a completed questionnaire, todate. The responses received were not complete for every questionnaire returned as many units did not have some of the data requested. Historical data was the most common data that was not included in the questionnaires.

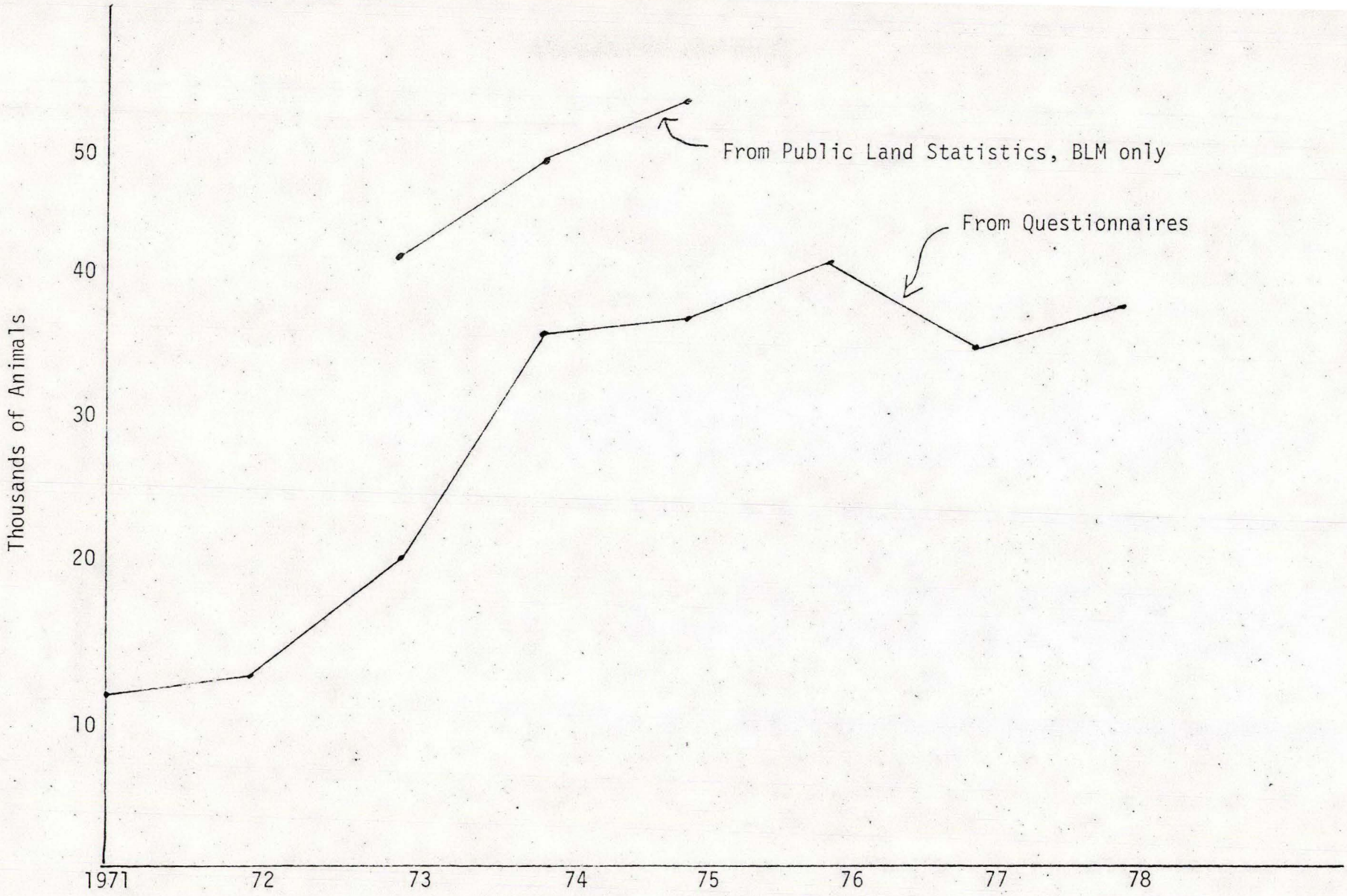

Figure 5. Number of Wild and Free Roaming Horses using BLM and FS lands, 1971-1978.

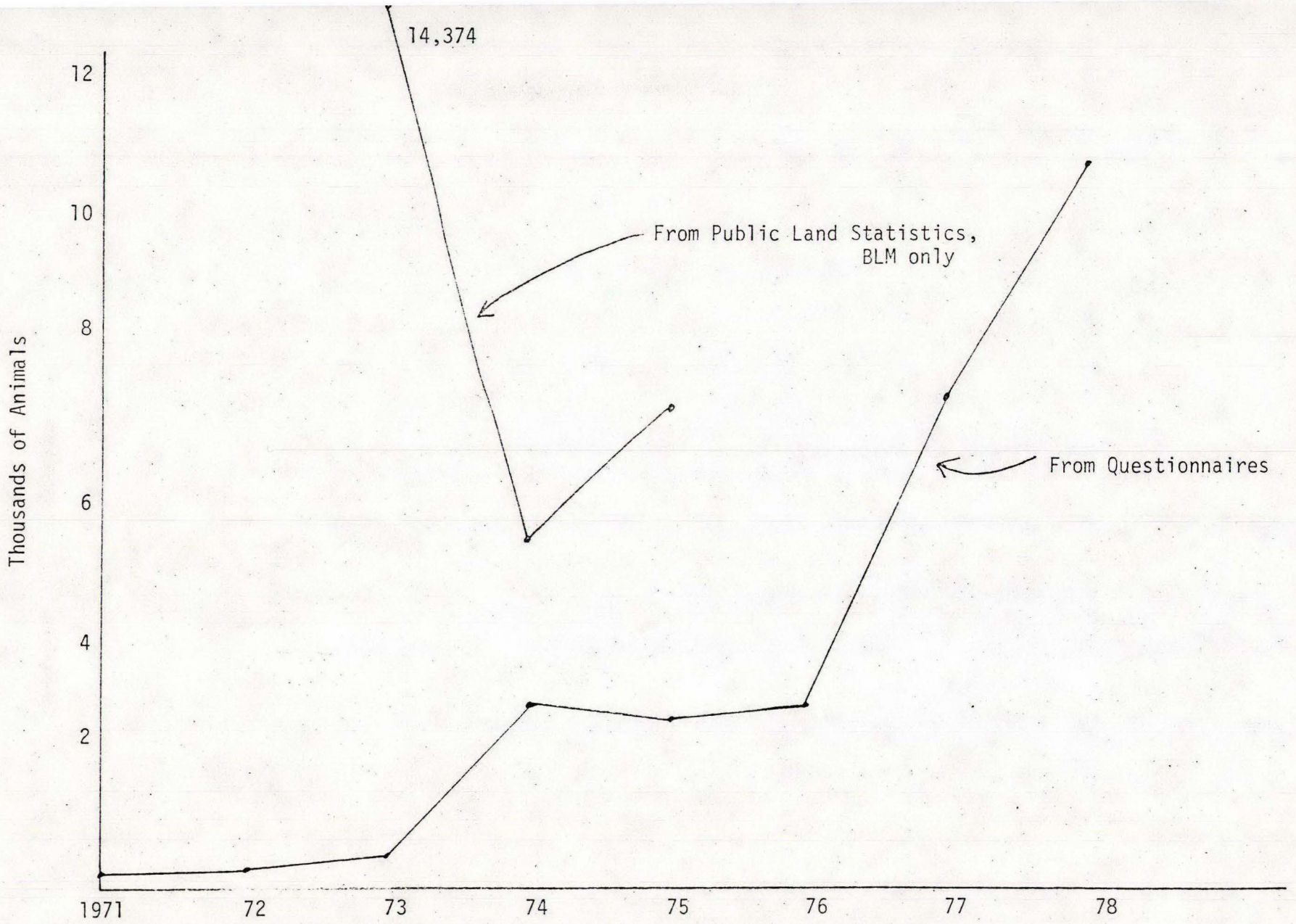

Figure 6. Number of Wild and Free Roaming Burros using BLM & FS lands, 1971-77.

Population

Perhaps the first problem faced by most FS or BLM administrators concerns the problem of determining the number of animals that use lands they administer. Agency personnel must, as perscribed by law, maintain numbers so as to "...achieve and maintain a thriving natural ecological balance on the public lands..." in an effort to "...protect the natural ecological balance of all wildlife species..."

One of the reasons why population estimates have been questioned stems from the fact that historical records of WFHB are commonly not available. For example, the data in Figures 5 and 6 suggest that WFHB populations have increased dramatically since 1971. However, most of the early estimates[7/] are subject to considerable error. As a result most WFHB advocates have questioned the need for roundups. Recent counts and population estimates however, are generally felt to be fairly accurate. If they are acceptable estimates, it is likely that the number of WFHB that existed prior to 1971 were probably larger than most people suspected. This is further substanciated by the work of Wolfe and Malachek (1977) which indicates that the 20 to 30 percent yearly increases in population that are commonly quoted are biologically improbable. It is generally conceeded, except by the most ardent WFHB advocates, that WFHB populations have increased and that control of further increases are necessary. The justification of roundups is however, commonly based on arguments associated with starvation, multiple use conflicts such as watershed protection or competition with other species (e.g. bighorn sheep, deer or domestic livestock) and use of non federal lands or lands administered by other federal agencies of the federal government.

7/ Most of the forest and districts responding did not include population estimates prior to 1975. Furthermore the data obtained from the questionnaires were generally less than those found in the FS and BLM reports to Congress.

Use of Non BLM/FS Land

PL 92-195 clearly states that if WFHB stray "from public lands onto privately owned lands, the owners of such land may inform the nearest Federal Marshall or agent of the Secretary, who shall arrange ot have the animals removed." Many instances occur however, where WFHB spend large amounts of time on private lands. For example, approximately 12 percent of the feed used by WFHB comes from private lands (Figures 7 and 8) while more than 75 percent comes from lands administered by the BLM.

Figure 7. Percentage of Forage removed by Wild and Free Roaming Horses by ownership, 1978.

Figure 8. Percentage of feed removed by Wild and Free Roaming Burros by ownership, 1978.

WFHB populations not only use private, FS and BLM administered lands, they also use lands that are administered by state land departments and other federal agencies. This utilization pattern raises several interesting questions. For example, WFHB populations could displace other uses (e.g. livestock) on state lands which would in turn violate state laws which require that these lands be managed in a manner that will maximize the revenues that accrue to the state.

Various interest groups (e.g. Wild Horse organizations, Humane Society) continue to show high interest in the problems associated with reductions in WFHB numbers. As a result, agency personnel have often been criticized for or stopped from reducing the size of a particular population. However, many organizations, particularly livestock organizations and state Fish and Game departments,[8/] favor

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8/ There were the two groups that were most commonly listed by agency personnel as favoring reductions in WFHB. Most of the WFHB organizations (e.g. WHOA, International Society for the Protection of Mustangs and Burros, National Mustang Association) do not oppose roundups, while some favor more roundups.

more roundups. In addition, many "environmental" groups (e.g. Sierra Club, Wildlife groups) were suggested by BLM and FS personnel as favoring roundups. Only the American Horse Protection Association was named by agency personnel as consistently[9/] opposing WFHB roundups.

While reductions in or control of WFHB populations is generally conceeded as being necessary, it is not obvious as to how this control should be done. For example, the Park Service has recently proposed to shoot Burros using the Grand Canyon. This proposal has met considerable controversy but few alternatives exist as the costs of removal are nearly prohibitive.

The major objection raised by interest groups that oppose reductions concerns the "humane" treatement of these animals. Anyone familiar with wild or domestic livestock realizes however, that any roundup will place stress on animals that will sometimes result in injury or death. Data from the FS and BLM indicate however, that deaths associated with roundups is not as high as some groups have claimed. For example, in 1977, 7450 WFHB were captured. Of this total 367 died (4.9%) during the period from capture to adoption. Comparable data for 1978 indicate that 4476 WFHB were captured of which 207 died (4.6%) during the period they were being handled by agency personnel. While these deaths may seem high to some, it may be no higher than the death rate of WFHB that are adopted[10/]. Furthermore, many of these animals were destroyed because they were judged to be unacceptable[11/] by potential adopters.

9/ Some organizations oppose any roundups in favor of letting "nature take its course."

10/ No data are available on the deaths or disposal of WFHB that have been adopted. Many agency personnel feel that the adoption program is not working from a humane point of view because enforcement and follow up is expensive, time consuming and in some cases nearly impossible.

11/ Some WFHB groups have established areas where non adoptable animals

Once population numbers have been estimated and judged to be "too large" or if other land administrators (e.g. private) ask for WFHB to be rounded up, BLM and.or FS officials have generally conducted a roundup. However, many WFHB were claimed as being privately owned (feral). For example, the second report to Congress (1976) indicates that 17393 horses and 123 burros were claimed as being feral[12/] in 1974 while 11,073 horses and 84 burros were claimed in 1976. As a result much of the capture and disposal of excess WFHB was done by private individuals until recently--few districts and forests captured any WFHB until 1977. WFHB that were claimed as being feral did not create a major disposal problem but considerable controversy has been generated regarding state estray laws and their relationship to WFHB--i.e. who judges and how are estrays to be handled. (Maynez, 1977; and FS and BLM, report to congress 1974, appendix 11). Once the agencies began to capture WFHB however, the problem of disposal became an increasingly troublesome problem.

Most WFHB that are captured during agency conducted roundups become part of the BLM's "adopt a horse" program. For example, as of 13 September 1978, 9792 horses and 943 burros had been adopted through the BLM program by 3900 individuals (3384 people adopted horses).

Several problems have existed and will continue to plague this program however.

Age and Sex

The first problem faced by BLM/FS personnel stems from the fact that while the number of horses captured by sex is nearly even, most

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12/ Animals claimed as being feral are subject to tresspass regulations.

adopters want females. For example, of the 13,650 horses desired in September 1978, nearly 75 percent were specified as females. As a result, many of the males are not desired and cannot be adopted.[13/] This problem is further complicated by the fact that most applicants prefer relatively young animals (Tables 1 and 2) while the proportion of animals captured is much older. While the provisions found in the Rangeland Improvement Act of 1978 could change these trends (WFHB can become private property after a year) it is generally an accepted fact that the disposal of older male animals has been and will probably continue to represent a failure of the adoption procedures.[14/]

Adopters

The second problem that faces administrators of the adoption process involves the screening of adopters. Experience has indicated that about 10 percent of the applicants actually come to pick up a horse or burro. Second, it has generally been decided that no adopter can normally obtain more than four animals.[15/] This restriction was recently implimented in an effort to reduce the demand for WFHB that would be used for commercial products (e.g. pet food) or rodeo stock.

13/ Most of these animals are mature jacks or stallions which often cannot be broke, or domesticated.

14/ No data was available at this time that could further verify this statement.

15/ The maximum number has changed over time. An unknown number of adopters are able to obtain more animals, than the maximum number specified. For example, one adopter obtained 160 head and another 104 head from the Rock Springs district and shipped them to Missouri in 1977.

Table 1. Number of horses desired for adoption by sex and age class, 29 September 1978, BLM adopt a horse program.

	Male		Females	
Age	Minimum	Maximum	Minimum	Maximum
0	1150	27	2759	55
1	943	267	2564	601
2	737	544	2487	1148
3	223	470	1338	1280
4	346	441	694	945
5	30	402	138	1285
6	102	190	130	765
7	3	54	2	449
8	2	241	0	845
9	1	33	1	266
10		324		901
11		3		44
12		85		288
Over 12		456		1240
Total	3537	3537	10113	10113

Table 2. Number of burros desired for adoption by sex and age class, 29 September, 1978, BLM adopt a burro program.

	Males		Females	
Age	Minimum	Maximum	Minimum	Maximum
0	1150	27	2759	55
1	943	267	2564	601
2	737	544	2487	1148
3	223	470	1338	1280
4	346	441	694	945
5	30	402	138	1285
6	120	190	130	765
7	3	54	2	449
8	2	241	0	845
9	1	33	1	266
10		324		901
11		3		44
12		85		288
Over 12		456		1240
Total	3537	3537	10113	10113

Perhaps the least known aspect of the adoption procedure concerns what happens to the animals that are adopted. The news media has capitalized on abuses of the law (ABC news, 20/20 January 8, 1979) but agency personnel have limited ability to enforce the laws that have been passed. The major reason why this is true stems from the fact that 35 percent of the WFHB are transferred to locations out of the west (see Figure 9). Enforcement therefore becomes costly and is beginning to involve personnel in areas that do not have any WFHB (e.g. Salem and Eugene Oregon, Eastern States).

Some have questioned the ability of the adoption program to place all of WFHB that are being captured. However as of 26 February 1979, 7469 applications were being held by the BLM for 2219 burros and 18,990 horses. While many (90%?) may not pick up an animal, the recent change in the law whereby private ownership can be obtained should increase the potential of placing WFHB. This avenue should not be viewed as a never ending source for placing WFHB, however. This is emphasized by the fact that only 11,488 horses, 1047 burros and 10 mules have been adopted from BLM districts as of February 1979--a period when interest in adoption was probably at its highest level.

While it is not known how many of the 598 horses and 63 burros that were killed during the 1974-1979 period were destroyed because they were not adoptable, the data from several districts suggests that 75 percent or more were destroyed for this reason. Most of the horses (83%) and burros (89%) that have been captured have been adopted but it is not known how may were subsequently destroyed by adopters because they found them to be unacceptable.[16/] Furthermore, it is not known how acceptable adopters have found WFHB once they have been obtained.

16/ Numerous "horror" stories exist which indicate that at least some adopted animals are not humanely treated.

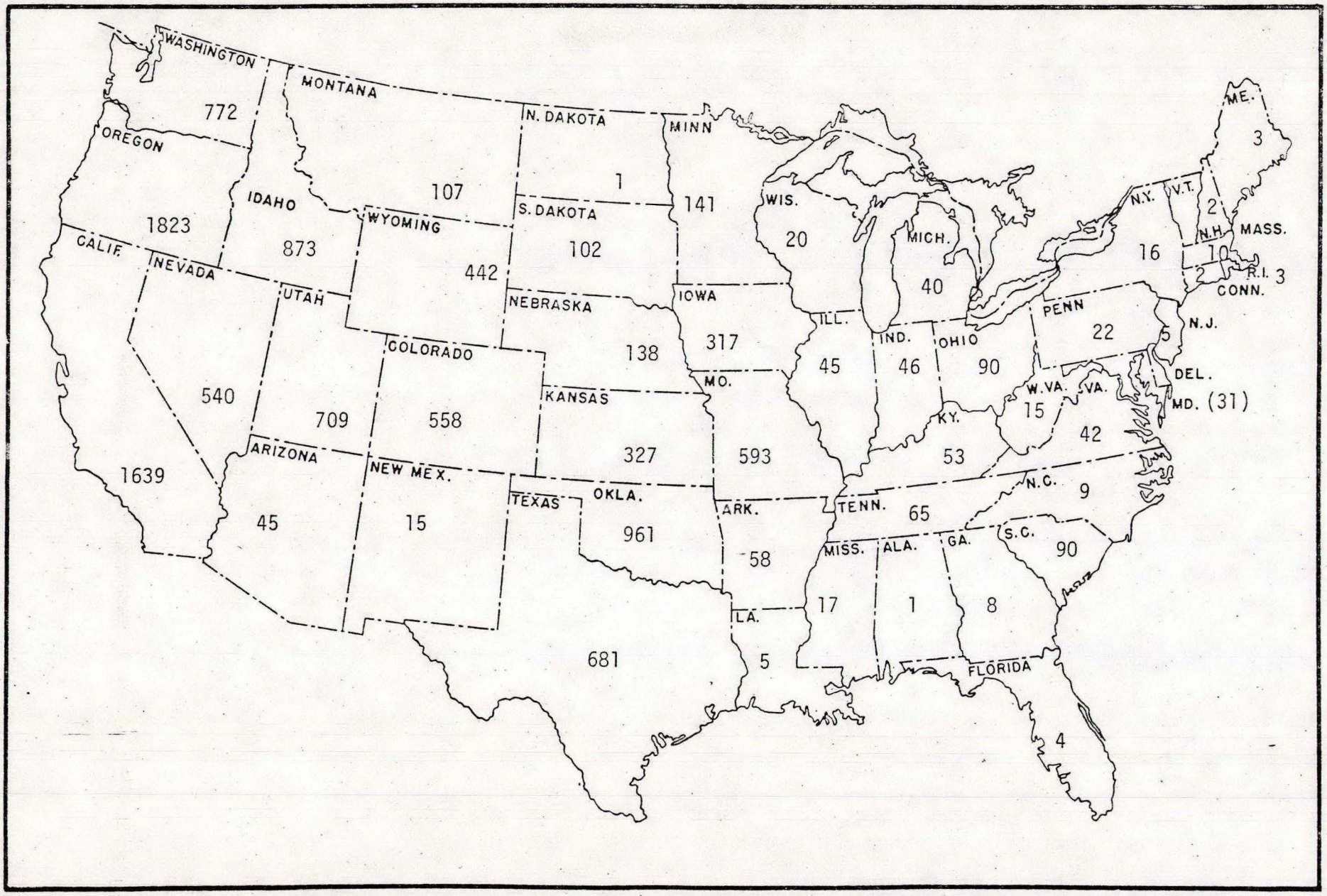


Figure 9. Distribution of WFHB adopted from BLM lands, number by state, February 1979.

Like all programs associated with the use of public lands WFHB are not a "free lunch"--there are costs and benefits associated with the management of herds. The following should therefore, be viewed as a first approximation of some of the benefits and costs associated with the management of WFHB.

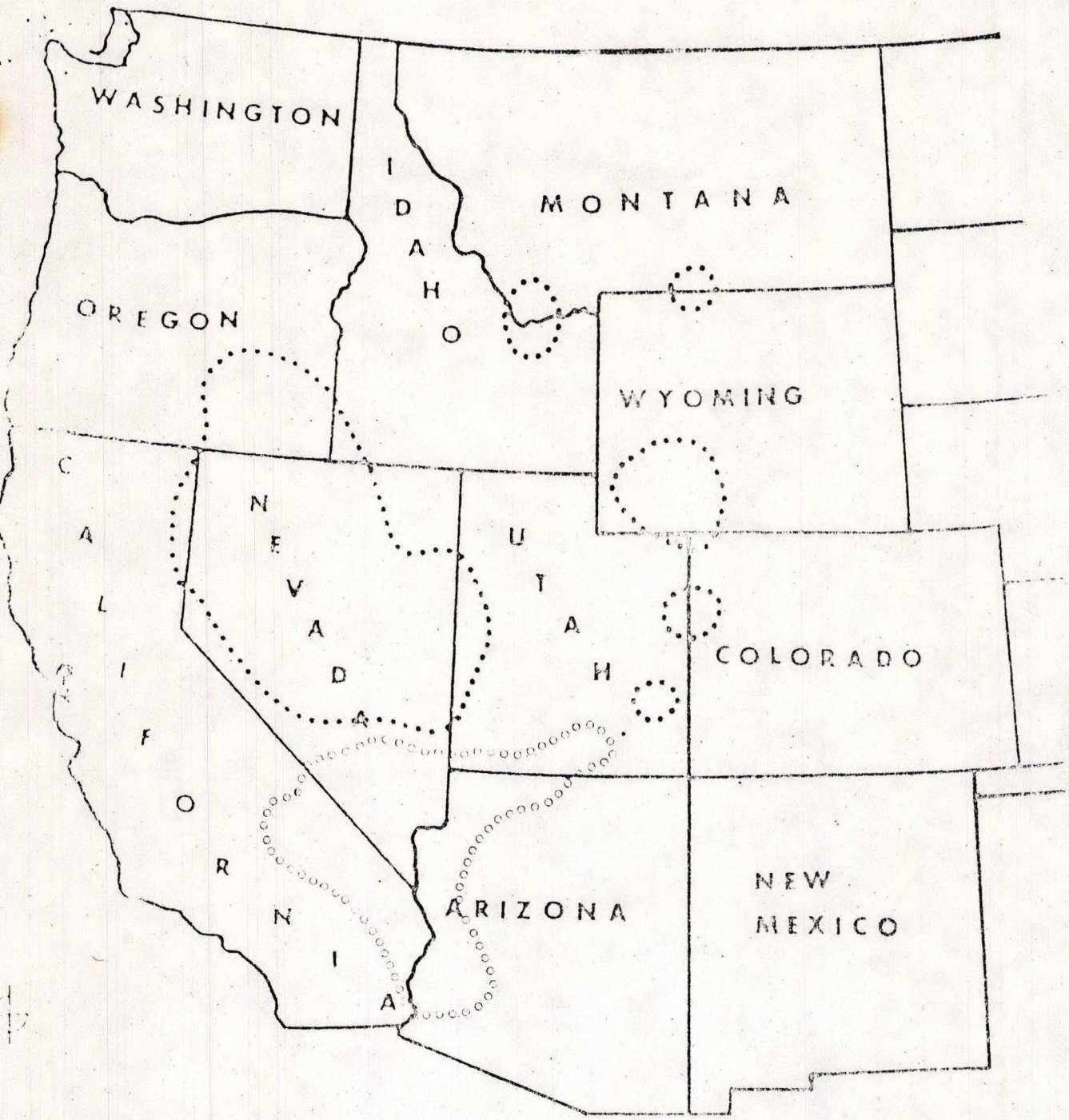
Economic Impact of WFHB Management

Most economic impacts differ when viewed from the perspective of alternative interest groups. This is also true for WFHB management. The following will therefore view the economic impacts of WFHB management from the following viewpoints: federal land management agencies, other user groups, regions/states, adopter and other interest groups.

Federal Agencies

Perhaps the most obvious economic impact of management of and for WFHB is on the budgets of the federal land management agencies. While some would argue that WFHB management is a relatively inexpensive program, the data provided by the BLM and FS indicates that it is not. For example, 45 districts and forests[13/] returned the questionaires which indicated that they had directly spent more than 200 man months of time, more than $50,000 for improvement, and approximately $50,000 for facilities during fiscal years 1976, 1977 and 78. This amounted to approximately $470,000 in 1976, $719,000 in 1977 and $612,000 in 1978 which was exclusive of all roundup and adoption costs. Furthermore, this did not include the expenditure for the supervision of WFHB programs. These costs are not trivial as BLM personnel have estimated that more than 1,000 man months of time were devoted to WFHB management bureau wide. This represented a budget amount of nearly 1.7 million dollars during fiscal year 1978. These costs

13/ Many districts and forests did not estimate these costs



LEGEND

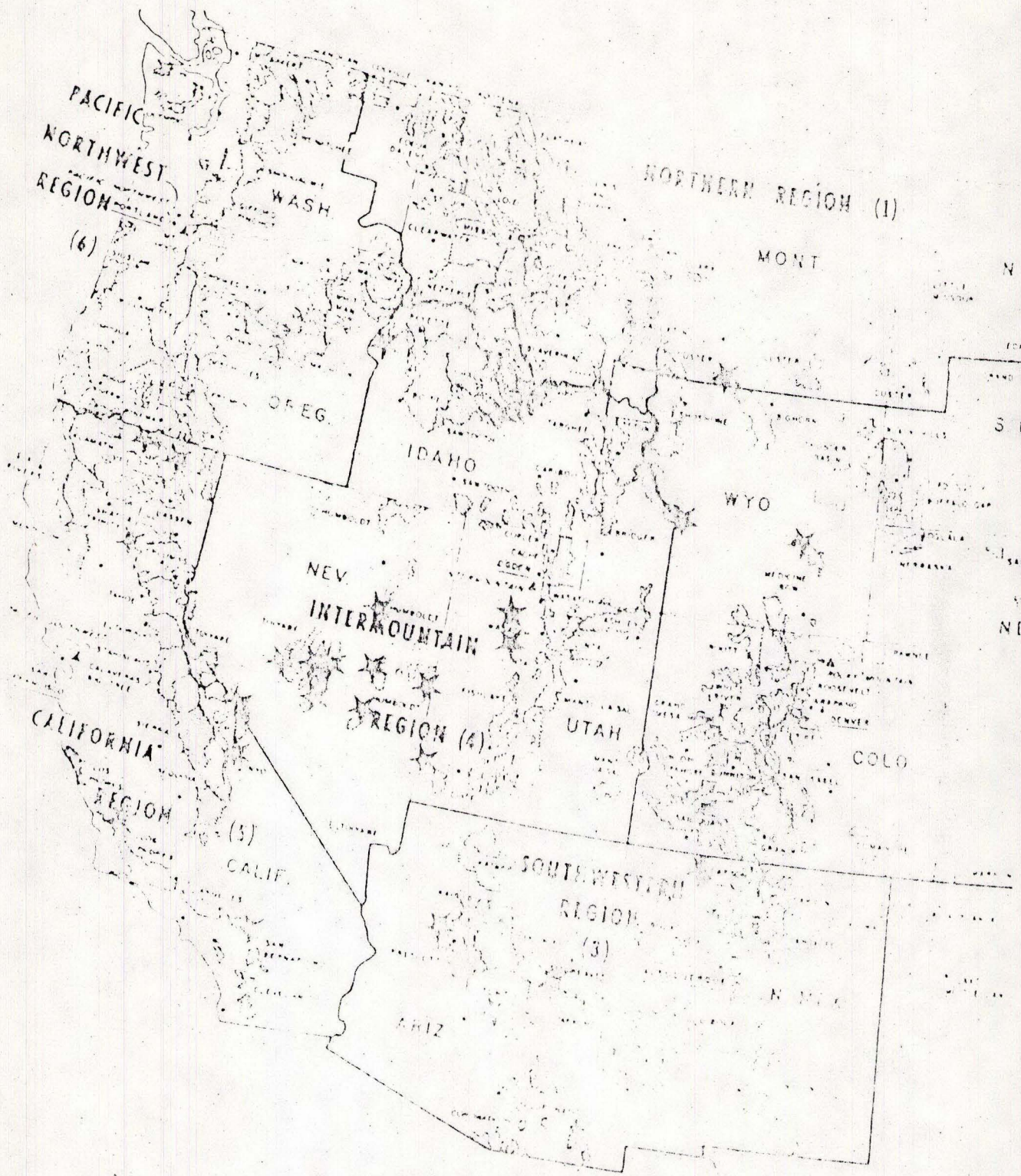
MAJOR WILD HORSE AREAS

MAJOR WILD BURRO AREAS

WILD HORSES AND BURROS IN THE WESTERN STATES

United States Department of the Interior

Bureau of Land Management



Possible Locations

Wild Free-Roaming Horses and Burros

JANUARY 1974

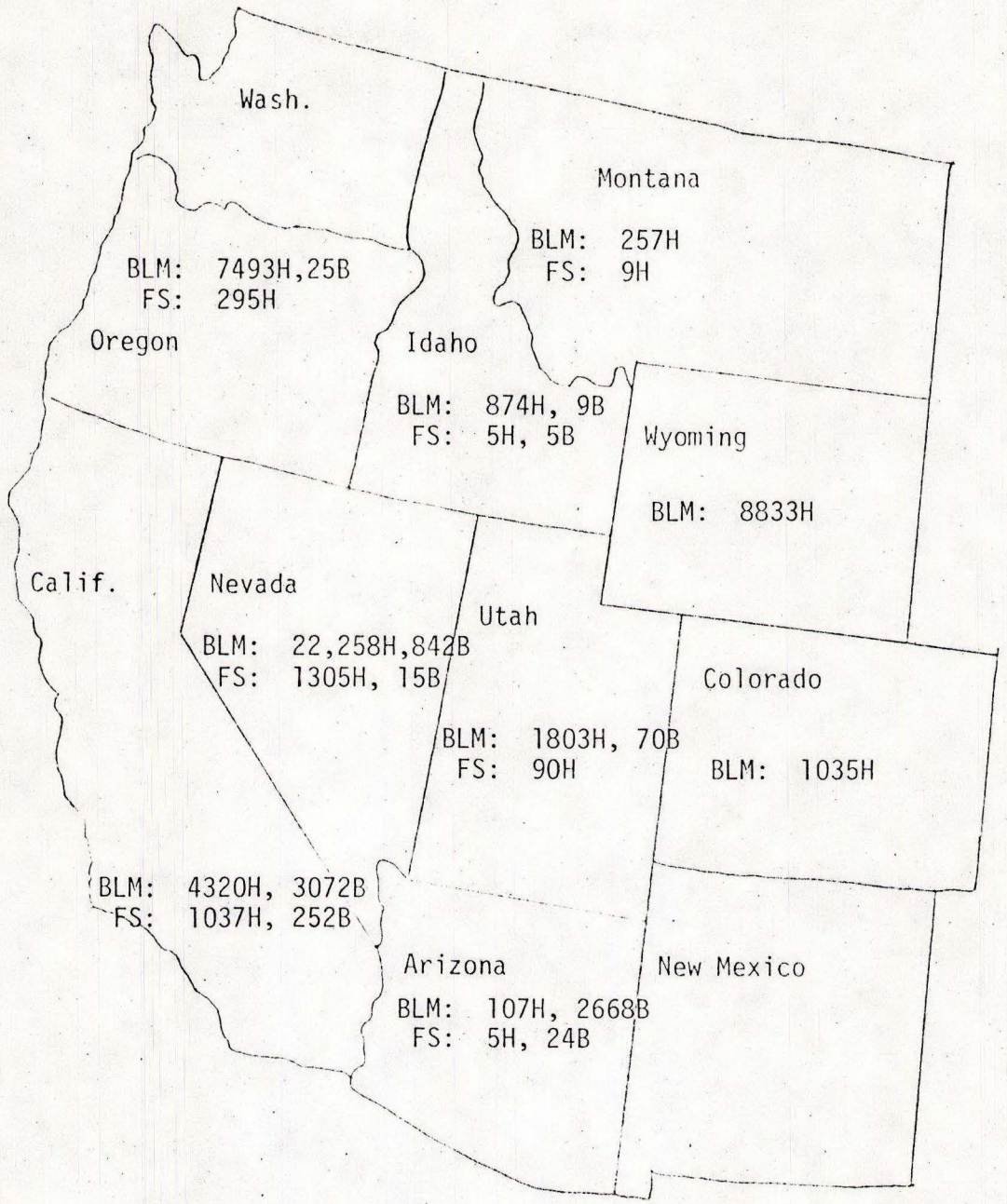


Figure 10. Number of Wild and Free Roaming Horses(H) and Burros(B) located in each state by Agency, 1976.

Source: 2nd FS/BLM report to Congress.

represented more than was spent by the BLM during 1978 in rounding up and adopting out the approximately 6,500 head of WFHB captured--1.4 million dollars were spent in this activity. Similar costs are not available for the FS but it is likely that they did not spend as much as did the BLM as they did not round up or manage as many WFHB. These overall costs however, are not indicative of the problems within the agencies, because WFHB populations are not evely distributed. For example, the following figures on the following pages, which were taken from the 1974 FS/BLM report to Congress, indicates that not all forests and districts have WFHB. Furthermore, the number of WFHB that exist by state varies widely (Figure 10). For example, nearly 79 percent of the burros managed by the BLM are located in Arizona, California and southern Nevada. These differences also exist between the agencies involved. For example, the BLM administrators administers nearly 18 times as many horses and nearly 22 times as many burros as does the FS. While horses exist in other places, the problems are particularly accute for BLM districts located primarily within the Great Basin and western Wyoming. The primary districts include: Susanville, California; Battle Mountain and Carson City, Winnemuca, and Ely Nevada; Craig, Colorado; Lakeview, Baker and Burns, Oregon; and the Rawlins and Rock Springs districts in Wyoming. The primary Wild Burro management areas include the Pheonix and Yuma districts in Arizona and the Bakersfield, Riverside and Susanville districts in California. One must therefore conclude that the impact of WFHB is not an agency wide problem except to the degree that monies allocated to districts and forests having WFHB could be used elsewhere.

Roundup/adoption

Costs

The data in Table 3 show that large differences exist in the roundup and adoption costs of the agencies that have collected with horses or borros. These data indicate that it generally costs more than $100 just to roundup a horse or burro. In addition, other costs such as branding, vaccinations, identification, feed and care, transportation, veterinarian expenses and adoption procedures may result in expenditures of $150 or more per animal captured.[14/] Furthermore, BLM and FS costs increase to $135 per head for rounding up and a total of $190 per horse adopted. Similar costs for burros are $130 for roundup and total costs of $203 per burro adopted. Thus, it could easily cost the American taxpayer $200 or more per animal just to place a WFHB with an acceptable adopter, if all overhead (e.g. supervisory maintenance) costs were ignored. Furthermore, this would not include the enforcement costs of insuring that adopters treated the animals in a lawful manner. This would also not include the average cost of $100 per horse or $72 per borro for readopting horses or burros that are either returned or must be picked up for readoption.

While no data are available which can be used to estimate the total agency costs of WFHB management, the BLM indicated that they spent about $450 per adopted animal. This probably represents a reasonable estimate of the direct cost borne by taxpayers to place a WFHB under private maintenance. As large as these costs may seem to some people, they do not represent the total costs of WFHB management. Of perhaps as great importance, are the costs borne by other uses or user groups that result from maintaining WFHB populations.

14/ These costs would increase if supervisory costs borne by the agencies were also included.

Table 3. WFHB Roundup and Adoption Costs by Agency and Mehtod of Capture, 1977 and 1978.

Method of Catpure	Year	Agency(s) involved	Type of animals	No. captured	No. adopted	Cost per animal captured: Roundup	Cost per animal captured: total	Notes
Water Trapped	1977&78	FS & BLM	Horses	508	318	105	114	
Dry Trapped	1977&78	FS & BLM	Horses	2241	1973	48	113	
Horseback	1977&78	FS & BLM	Horses	657	485	195	280	
Horseback & Watertrap	1976	BLM	Horses	348	278	80	280	
Helicopter	1977&78	FS & BLM	Horses	3603	1826	90	119	
Water Trapped & Helicopter	1977&78	FS & BLM	Horses	2665	2482	94	143	
Horseback & Helicopter	1977&78	FS & BLM	Horses	282	92	314	342	
Not specified	1976-78	FS & BLM	Horses	389	322	164	206	
Roping	1977&78	FS & BLM	Horses	13	12	115	164	
Other Traps	1977	BLM	Horses	64	46	75	75	
Herding	1975-77	BLM	Horses	105	38	655	686	
Helicopter/riders/ set traps	1977-79	BLM	Horses	665	477	388	541	
Roping/Water traps	1977	BLM	Horses	10	10	80	140	
Tranquilizers/roping	1978	FS & BLM	Horses	11	9	1000	1060	
Average*	1977&78	FS & BLM	Horses	10596	8875	113	160	
Water traps	1977	BLM	Burros	120	120	not specified		
Water traps & roping	1978	BLM	Burros	478	445	179	263	
Pasture Trap/horseback roped	1977	BLM	Burros	679	179	100	200	
Average*	1977&78	BLM	Burros	1330	1185	115	181	
Immobilization	1977	Park Service	Burros	11		922	1122	Grand Canyon
Herding	1977	Park Service	Burros	24		440	440	Grand Canyon
Contract	1978	Sport Fisheries & Wild life	Horses	369		95	177	Sheldon-Hart Mountain-Meado Refuge
Helicopter & Riders	1977	Defense	Horses	95		178	214	Dugway Proving Grounds
Horseback & Trap	1977	Private	Horses	122		249	249	Salmon River Cattlemen's As

*Additions do not equal averages, due to rounding.

Impact on Other Uses

Very little is known concerning the impact of WFHB populations on other uses. Furthermore, very few land managers were willing to estimate their impact on other users. The following therefore represents a "crude" estimate of some of these impacts.

Domestic livestock

Ranchers represent not only the historic suppliers of most WFHB populations that currently use public lands, they are also one of the first groups to favor reductions in WFHB populations. One should realize that many ranchers have historically[15/] put stallions in wild bands in an effort to improve herds and have captured excess animals for over a century.

Anyone fimiliar with the areas used by WFHB realizes that much of this land neither is nor has historically been used by domestic livestock--rough terrain and lack of water often limits the use of some areas by domestic livestock. Therefore, the impact of WFHB populations will vary by area. One can estimate how important WFHB populations might be however, if the following assumptions are made. First, if the current member of wild horses was assumed to be 50,000 head then about 600,000 animal unit months[16/] (AUM) of forage would be taken by these animals. In addition, if 10,000 wild borros were in existence, they would use perhaps 120,000 AUM's of forage. If 50% of the forage presently and by horses and

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15/ It is interesting that these ranching practices which helped foster the growth WFHB populations in the past now represent one of the major reasons why ranchers in these areas are being excluded from using public lands. One could almost view this as finding that you have been your own worst enemy.

16/ An animal unit month is generally accepted to be the amount of forage needed to feed a thousand pound animal one month.

25% of that used by burros were instead taken by domestic livestock, then 330,000 aums would be available. This would support about 27,000 head of cattle for a year or alternatively this might produce an additional[17/] 2.5 million pounds of meat which at 50 cents per pound would represent 1.2 million dollars[18/] worth of meat per year that might have been forgone in favor of WFHB.

Approximately 40 percent of the agency personnel which returned questionnaires indicated that WFHB are having a measureable[19/] negative impact on domestic livestock grazing. The remaining personnel generally indicated that WFHB have a negative impact on the use of public lands by livestock but no measurable impacts were indicated.

Big Game

Personnel from only 7 districts or forests were able to identify any measurable impact of WFHB on big game animals. These impacts varied greatly but were generally felt to be not well known. Personnel on 19 other forests and districts also noted that the impact of increasing populations of WFHB generally had a detrimental impact on big game animals. The species affected most were deer and elk. However, there was general agreement that burro populations have a strong negative impact on bighorn sheep populations in

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17/ This assumes that each animal unit will gain 1/4 of a pound per day or 7.5 pounds per AUM.

18/ This ignores the impact this increase in quality would have on price. However, given the US production of approximately 20 billion pounds in 1976 (Ag Statistics, 1976) it is unlikely that 2.5 million pounds would have an appreciable effect on price. This estimate however, should be viewed as only a very rough approximation.

19/ Most of the respondents indicated that WFHB and livestock often directly competed for forage and that AUM's for WFHB have been commonly taken from livestock in areas where competition is direct.

Nevada, California, and Arizona. Perhaps the most striking input received from agency personnel was the fact that the impact of WFHB on almost all forms of wildlife is generally unknown.

Watershed

Nearly all of the district and forest personnel indicated that the impact of WFHB on watershed was unknown. A few (20) respondents indicated that their impact was often negative but were not willing to estimate their impacts. One district indicated that sedimentation had increased as a result of soil compaction and the elimination of vegetative cover by WFHB. If numbers are kept under control however, the negative impact of WFHB, like most other grazing or browsing animals, on watershed can be kept to a minimum. If numbers are allowed to become excessive plant cover will decrease with an increase in sedimentation.

Recreation

Many writers have romaticized WFHB and have emphasized the beauty of wild and free roaming animals. This would tend to indicate that WFHB should have recreation value. The 12 districts or forests that estimated recreation generally indicated however, that little recreation was associated with these animals. Further, more of the recreation days estimated (see table 3) most was associated with wrangling. This

Table 3. Number of recreation days associated with WFHB on 12 districts or forests, 1970-76.

	YEAR						
Activity	1979	1971	1972	1973	1974	1975	1976
Wrangling							
legal	810	130			450	980	520
illegal	0	15	15	20	15	18	18
Sightseeing	267	267	277	337	347	507	532
Other	0	20	20	20	20	20	20
Total	1077	432	312	377	832	1535	1090

activity was specifically curtailed in 1971 and represents both the major reason why some groups favor roundups and the primary recreation activity associated with WFHB from a historical perspective. The two primary reasons why little recreation is associated with WFHB populations stems from the fact that: (a) they are generally located in remote areas and (b) very few people specifically expend time or money to go see WFHB herds--they are generally viewed as part of another activity such as boating on a river, hunting, fishing or travel to another area. If the responses received from the agency personnel are indicative, one could safely say that increasing or decreasing the number of WFHB will have essentially no direct[20/] impact on recreation.

Other impacts

The only other impact that was mentioned by agency personnel was generally tied to livestock grazing. These managers generally indicated that WFHB population had essentially stopped many programs, such as the implementation of grazing systems or other range improvements, that were designed to improve the condition of the forage resources of an area. Some managers also indicated that WFHB had destroyed some watering facilities (e.g. springs, water holes), increased the amount of fence maintenance needed, and they may eliminate rare or endangered plants or animals. Most of these impacts become more severe as members are allowed to increase. Therefore, the control of numbers could decrease these detrimental impacts. The preceeding does indicate however, that little is known, quantitatively, of the impact(s) of WFHB on other uses.

20/ The indirect impacts could be large if WFHB populations reduce wildlife numbers which are hunted or viewed or are allowed to increase sedimentation loads which generally decrease fish populations. One should note however, that some impacts are direct. For example, Park officials in Death Valley indicate that burros are sometimes bed like bears have been in Yellowstone Park (positive experience) and also essentially destroy camping areas by monopolizing water holes and concentrating faces material on available camp sites near springs and waterholes.

The preceeding has essentially outlined some of the major costs associated with the management of WFHB populations. There is another side however, that must also be raised, i.e. what is the value of and demand for WFHB.

Value of/Demand for WFHB

Very little is known about the value of or demand for WFHB. These animals may have value from several perspectives. Some of the probable values are associated with: sightseeing; photography; objects of scientific research; potential domestic animals which can be used for riding, showing, breeding, use in rodeos, etc., or they could, if the law was changed, be made into various products such as pet food for human consumption. In addition, they probably have some value as part of the western folklore (option or existence value).[21/] While most of these values could be measured, they were not in this study as time and budget restrictions limited its scope. Some information (table 4) was gathered from agencies which have auctioned wild horses or burros to the highest bidder. These values should not be viewed as representing

Table 4. Sales of Wild horses or burros by agencies not subject to the WFHB Acts.

Type of Animal	Agency	Average selling price	date/location	
Horses	Defense Depart.	$ 87.77	Utah	1977
Horses	Fish & Wildlife Ser.	132.20	Calif.	1978
Horses	"	172.42	Calif.	1978
Horses	"	207.00	Calif.	1979
Burros	Park Service	11.00	Ariz.	1977

the total value of a WFHB, but they do indicate that the receipts obtained by these agencies from the sale of excess wild horses or burros have generally not covered capture costs. These data do indicate however,

21/ See Krutillar and Fisher (1975) for a discussion of these values.

that people who do adopt WFHB probably receive a large subsidy. Furthermore, at the current demand for horsemeat, the potential exists for substantial profits to be made. For example, horses in "good" flesh will often sell for 40 to 50 cents per pound which would represent a value of $400-500 per animal if they could be converted to commercial products. Animals illegally sold at these prices would probably yield a substantial net return if the costs of possible legal action were zero. This also indicates that the potential exists for illegal roundups as capture and transportation costs would probably be less than $200 per animal which could yield a net return of $200 or more. These net returns also indicate that if the laws and regulations governing the management of WFHB were changed, the government would be able to offer permits to capture WFHB at competitive bids which would yield a return to the federal treasury. This would however, change the distribution (who benefits and who pays) of the benefits and costs of WFHB management.

While the preceeding has indicated that some estimates of the benefits and costs of WFHB are available, much is unknown. These unknown factors suggest that research is needed which will assist federal land managers and the U.S. citizenry to better evaluate the role of WFHB as users of America's public lands.

Research Needs

Most of the research that has been advocated by others (e.g. see Artz, 1977) is basically ecological. It is recognized that much of this information is needed before an economic evaluation of the WFHB problem can be conducted. However, a large portion of the work advocated by others will not answer the two basic questions faced by agency personnel--i.e. how many WFHB can be justifiably be provided and how can they be most efficiently be provided and managed? The following therefore

represents some of the major socio-economic questions that need to be answered before the preceeding issues can be resolved.

Demands for WFHB

Perhaps the greatest need that exists, of an economic nature, stems from the fact that very little is known of the value of or demand for WFHB. Opinions vary widely as to their value. For example, some feel that they have no value while others feel that they should receive preferential treatment because they are assumed to have high value. Some of the more important demands needing research include their value as: domesticated animals (riding, breeding stock, rodeo, etc.), for use in commercial products, and their value as part of the natural ecosystem (option, research and existence values). There is also some need to evaluate the uses of horsemeat for which the original acts were passed--i.e. What portion of the horses killed are actually used in pet foods, human consumption, etc? Were the WFHB acts passed to eliminate practices which do not, in fact, occur?

Adoption procedures/success

The current regulations and laws governing the use of WFHB that are adopted place some rather stringent restrictions on potential adopters. Furthermore, as was indicated before, there are economic incentives that would lead some people to break the law. It is known that some people have ignored these restrictions. There is therefore, a need for someone to objectively evaluate the adoption procedures. How many of the animals that have been adopted to date are currently retained[22/] by original adopters

22/ This response will probably vary by age, sex and type of animal adopted.

and how many have been given to others, sold or destroyed? What is the potential for increased use of the adoption procedures under current as well as altered laws and regulations?

Control Techniques

As the data in the cost section above indicated, there are large differences in the costs incurred in rounding up WFHB. Further research is needed on these techniques to identify how these costs might be minimized. There is also a need to evaluate the cost, effectiveness and impact of techniques such as sterilization, killing and other alternative population control devises.

Maintenance of Populations

Several alternatives are available which could be used to provide the number of WFHB that could be justified. Some of these include the establishment of WFHB reserves and management areas, creation of new WFHB ranges, eliminating populations in some areas and various other combinations. Each of these will have differing impacts and costs that need to be economically evaluated. For example, given the capture costs and alternatives forgone in some areas it may be feasible to eliminate WFHB populations in one area while fostering herds in other areas.

Legal restrictions

One of the potentially least popular research areas among WFHB advocates, would be an evaluation of the costs of the restrictions that presently exist or may exist in the future. Some of the questions that might be addressed include:

(1) Does the legal restriction which does not allow WFHB to be used for "commercial" purposes result in the killing or use of other animals that are more valuable?

(2) What is the potential for selling wrangling permits in lieu of government conducted roundups.

(3) What would be the demand for WFHB if restrictions concerning commercial uses were lifted?[23/]

(4) What will be the impact of allowing private ownership on the demand for and use of adopted WFHB? Is the net effect the same as if no restrictions were in existence?

(5) What is the potential for selling excess animals by the government or by licensed wranglers to possible adopters?

It is research in this area that would probably have the largest impact on WFHB management.

23/ This would probably require some type of permit system to eliminate unnecessary captures.

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